specific putative receptor molecule of the immunoglobulin superfamily. Analyses of Tutl PNS expression revealed localization to Class III and IV dendritic arborization (da) neurons, suggesting that *tutl* may regulate class-specific dendritogenesis. Loss-of-function (LOF) analyses revealed cell-autonomous functions for *tutl* in promoting Class III and IV dendritic arborization and receptive field innervation. Conversely, gain-of-function (GOF) studies revealed ectopic Tutl expression in Class I da neurons results in increased dendritic complexity. The *tutl* LOF and GOF phenotypes, as well as Tutl PNS expression patterns, are similar to those observed for the Cut homeodomain transcription factor, recently demonstrated to mediate class-specific da neuron dendritogenesis. We therefore examined the potential that Cut may transcriptionally regulate Tutl expression in da neurons. Both LOF and GOF cut analyses suggest Tutl represents the first known downstream Cut transcriptional target in the regulation of class-specific da neuron dendrite morphogenesis.

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Program/Abstract # 409

The zebrafish calpain system – expression and role of calpain and calpastatin during early development

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The calpain superfamily is a large group of highly conserved calcium-dependent cysteine proteases that have been implicated in regulating a wide variety of biological processes such as cell adhesion, migration and intracellular signaling. Two heterodimeric typical family members, μ-calpain and m-calpain, have been studied extensively in vitro and in cell culture but few studies have been aimed at determining the function of calpain and its endogenous inhibitor calpastatin in vivo. Recently, calpain knockout mice have revealed that both m-calpain subunits are indispensable for survival of the pre-implantation embryo; however, the precise role the calpain system plays during early development has yet to be determined. We have cloned and characterized the temporal and spatial expression of four zebrafish genes encoding typical calpain catalytic subunits (capn1a, 1b, 2a, 2b), two genes encoding common regulatory subunits (cpns1a, 1b) and calpastatin (cast). RT–PCR and whole-mount in situ hybridization analysis reveals that these genes are expressed in distinct, yet overlapping, spatiotemporal patterns during the first 24 h of development. Preliminary loss-of-function experiments, employing chemical calpain inhibitors, cpns-directed morpholinos and calpastatin over-expression, suggest the calpain system might be necessary for the successful completion of morphogenetic movements, such as epiboly, and proper patterning of the dorsal–ventral axis.

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Program/Abstract # 410

Crip2 has dual functions in the cytoplasm and nucleus, induces non-canonical Wnt signaling during convergent extension movement in zebrafish notochord

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In notochord development, ntl induce intercalation of the cells, but their target or signaling cross-talks were unclear. We performed microarray experiment using ntl knockdown embryo of zebrafish and identified *Cysteine-rich protein 2* (*crip2*) as a transcriptional target of ntl. Crip2 expressed specifically in the notochord and regulate convergent extension cell movement of gastrulation. By molecular and cellular assay, Crip2 was localized in the nucleus on Wnt stimulation. In the nucleus, Crip2 bind to β-catenin and inhibited β-catenin/Tcf-dependent transcription. Moreover, Crip2 was also localized in cytoplasm, directly interacted with Dishevelled 2 and formed a complex with Crip2/Dvl2/Daam1/Diversin on non-canonical Wnt stimulation. Moreover Crip2 recruited this complex to the focal adhesion complex near the leading edge of cell and control cell morphology and migration. This is a first report elucidating the molecular mechanism of intercalation and directly interactions between ntl and canonical and non-canonical Wnt signaling.

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Program/Abstract # 411

Cadherin-based adhesion cooperates with non-canonical Wnt signaling to mediate morphogenesis in the zebrafish

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A critical step in central nervous system development is the shaping of the neural tube (or neurulation). *N-cadherin* (*N-cad*), a calcium-dependent, homophilic-binding cell adhesion molecule, has a conserved role in this process in vertebrates as disruption of *N-cad* results in a variety of neural tube defects. However, the role of *N-cad* in regulating the cellular and molecular mechanisms underlying neurulation has not been clearly elucidated. By direct analysis of cell behaviors, we have shown that although *N-cad*-depleted cells are not defective in their ability to form protrusions, they are not able to maintain them stably. Here, we begin to address whether *N-cad* functions solely as an adhesion molecule

or whether it has a signaling function during neural tube morphogenesis. In addition, we are investigating the role of two genes, which also appears to be required for proper neural tube morphogenesis, *Strabismus* (a zebrafish homologue of *Van-Gogh-like2*, a component of the non-canonical *Wnt* pathway) and *bumpy brain* (yet unidentified gene). Interestingly, these genes interact genetically with *N-cad* suggesting that they may function in the same or closely related pathways.

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Program/Abstract # 412
A cell cycle regulatory gene contributes to zebrafish somitogenesis
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In vertebrates, somites form in an anterior to posterior wave, with new somites deriving from tissue generated by the growing tail bud. Morphological segment boundary formation is presaged by oscillating gene expression cycles regulated in part by Notch signaling; these "waves" of gene expression begin in the tail bud and move anteriorly into the presomitic mesoderm (PSM) until they encounter a "wavefront" that stabilizes gene expression. In vertebrates, opposing gradients of FGF, Wnt and Retinoic Acid (RA) signaling converge to form the wavefront (e.g., Dubrulle et al., 2001; Sawada et al., 2001; Diez del Corral et al., 2003; Aulehla et al., 2003). In zebrafish, *fgf8* is expressed in a gradient, with highest expression in the tail bud and decreasing anteriorly; Fgf8 signaling antagonizes and thereby positions the wavefront (Sawada et al., 2001). *gadd45b*, a member of a family of genes induced under growth arrest and DNA damaging conditions, is expressed in a bilateral stripe in the zebrafish PSM (Durbin, et al., 2000). We have shown that *gadd45b* is expressed in the PSM at the anterior limit of Fgf signaling and that Fgf negatively regulates *gadd45b* expression. Interestingly, *gadd45b* expression is less sensitive to perturbation of other wavefront signals such as RA. We are using *gadd45b* depletion to further understand the role of Gadd45b in patterning and somite differentiation.

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Program/Abstract # 413
Functional significance of the E-cadherin/N-cadherin switch at the onset of Neurulation
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At the onset of neurulation, E-cadherin (E-cad) and N-cadherin (N-cad), two calcium-dependent adhesion molecules belonging to the classical cadherin subfamily, are expressed in complementary domains within the ectoderm of all vertebrates. E-cad is downregulated in the neural ectoderm and retained in the non-neural ectoderm. Conversely, N-cad is up-regulated in the neural plate. This switch in cadherin expression is also observed in other developmental contexts and prior to metastasis. In most systems in which these adhesion molecules have been studied, E-cad is typically found in highly polarized epithelia, where it is thought to maintain stable cell–cell interactions, whereas N-cad is associated with mesenchymal tissues that undergo cellular rearrangements. It has therefore been hypothesized that E-cad may promote epithelial cytoarchitectures whereas N-cad mediates dynamic cell behaviors such as migration. However, *in vivo* data to support this hypothesis is lacking. Here, we address, using the zebrafish as a model system, whether the non-overlapping expression domains of E-cad and N-cad reflect a differential role for these adhesion molecules during neurulation. We are currently analyzing the dynamic expression of *E-cad* and *N-cad* prior to the onset of neurulation and correlating these expression patterns with the cytoarchitecture of neural and non neural cells. We will next determine whether ectopic expression of E-cad in the neural ectoderm is able to rescue the neurulation defects in *N-cad* mutants. Our ultimate goal is to identify functional domains within E-cad and N-cad that may account for their distinct properties.

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Program/Abstract # 414
Sox4b is required for pituitary expression of *gata2* and specification of thyrotrope cells in zebrafish
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The adenohypophysis consists of at least six different cell types: somatotropes, lactotropes, thyrotropes, melanotropes, corticotropes and gonadotropes in mammals, and an additional cell type in fish expressing somatolactin. We investigate the role of Sox4b, a member of the SRY-like HMG-box (SOX) family in pituitary development. We found that *sox4b* is strongly expressed in the pituitary anlagen starting at 24 hpf and in the entire head region including the pituitary at 48 hpf. We show that *sox4b* mRNA colocalizes with the pan-pituitary marker *lim3* at 33 hpf and with *tshb* at 48 hpf. *sox4b* knock-down leads to a drastic decrease in *tshb* and *gsua* expression and reduced levels of *gh* and *slb* mRNA, while other anterior pituitary gland markers including *prl* and *lim3* are not affected. Furthermore, expression of the zinc finger transcription factor *gata2* is downregulated in